

REMARKS

In the Office Action the Examiner indicated that changes to inventorship were not made in PAIR. In a telephone conference with Examiner on November 24, 2004, undersigned counsel confirmed that all requirements have been satisfied to correct inventorship under Rule 47. Applicants have checked with the Office of Petitions and been informed that a Rule 47 petition to correct inventorship is handled by the Examiner (and not by the Office of Petitions).

The disclosure was objected to because a drawing heading was omitted. Applicants have amended the disclosure to insert the heading "Brief Description of the Drawings" on page 15, line 10.

Applicants have amended claim 1 to include the features of claims 5 and 6. Claims 5 and 6 have been cancelled. Claims 11-13 have been amended to place them in independent form.

Claims 1-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Porter et al (US 4,549,998) or GB 2108407 in view of Hayshi et al. This rejection is respectfully traversed.

Claims 11-13 were objected to as being dependent upon rejected base claims. Applicants have amended these claims to put them in independent form.

Traversal of 103 Rejection

Claims 1-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Porter et al (US 4,549,998) or GB 2108407 in view of Hayshi et al. This rejection is respectfully traversed.

Applicants respectfully suggest that, as conceded by the Examiner, Porter et al is entirely silent as to the provision of a pathway for passage of a heat transfer fluid on a side of the surface opposed to that across which the thin films of liquid are passed.

Additionally, GB2108407 discloses an entirely different sort of reactor which utilizes shear mixing in the continuous production of epoxide resins. The reactor has a circular stator 1 and a circular driven rotor 2 which each have mutually facing surfaces. The surfaces each have intermeshing tooth elements which help to provide intensive mixing of the reactants by deflecting the centrifugal flow of the reactants from the center of the rotor outwards. The reactor also includes a cooling jacket 8 containing coolant which removes the heat of the reaction. The cooling jacket is mounted on the fixed housing and therefore does not rotate. As a result of the

cooling jacket being stationary, free vortices do not form within the heat transfer fluid and thus the reactor does not require features to prevent their formation. This is an important distinction, since GB2108407 provides no motivation to those of ordinary skill to consider the effects of free vortex formation in the coolant, since the coolant is not passing through a rotor, but instead flows through a stator.

Turning now to Hayashi, this discloses a heat exchange mixer-reactor which includes an elongated casing surrounds a number of discs upon which reactant liquids react. The reactor includes two rotating shafts (9, 9') which each hold a plurality of discs. The discs held on shaft 9 rotate in the opposite way to the discs held on shaft 9'. In Hayashi, heat transfer fluid may be fed along the shafts 9, 9', but it is clear that the heat transfer fluid simply passes along the shafts 9, 9' and is not caused to contact a surface of each disk 13, 13' that is opposed to a surface across which reactants are passed. Accordingly, the heat transfer in Hayashi is relatively poor, since there is no heat transfer across the thickness of the disks, only where the shafts 9, 9' contact a central annulus of each disc. In order to provide additional heat transfer, Hayashi has to provide an outer casing 4 through which additional heat transfer fluid is supplied by way of inlets 5 and 6 and outlets 7 and 8. Accordingly, in contrast to the Examiner's position, the relative orientation of the disks and the shaft is of major importance for effective heat transfer.

Moreover, Hayashi does not teach or fairly suggest the special constructional feature of the present invention in which there is provided a hollow support element having a first, external reaction surface and a second, opposed, internal heat transfer surface, with a special plate or membrane provided so as to divide an internal space of the hollow support element into first and second spaces. None of the citation relied upon by the Examiner makes any mention of this special plate or membrane (item 22 in Figure 2 of the present application).

Quite regardless of this difference, applicants have further amended claim 1 by including the features of claims 5 and 6, namely the provision of vanes, fins, projections, mesh, foam or gauze on the opposed side of the plate or membrane so as to help prevent the formation of free vortices in the heat transfer fluid. This is required in the present invention because of the nature of the flow path of the heat transfer fluid, which passes outwardly through space 23 and then inwardly through space 24, the whole support element rotating throughout. Without the provision of the vanes etc. 29, free vortices will likely form in the space 24, which will lead to unacceptable pressure drops. This is explained at page 15, line 35 to page 16, line 1 of the parent

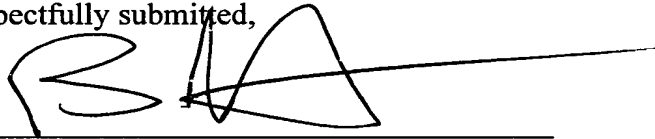
PCT application as published.

Applicants respectfully suggest that there is not consideration of these effects in GB2108407, since the heat transfer fluid passes through the stator. Nor is there any consideration of these effects in Hayashi, since there is no outward radial flow of heat transfer fluid followed by inward radial flow – the heat transfer fluid in Hayashi either passes straight along the shafts 9, 9', or passes through the stationary casing 4. Consequently, the present invention as claimed solves a problem that is not anticipated by any of the prior art disclosures, none of which, nor any combination of which, include the integers set forth in claim 1 as amended.

Should the Examiner feel that a telephone conference would advance the prosecution of this application, he is encouraged to contact the undersigned at the telephone number listed below.

Applicants respectfully petition the Commissioner for any extension of time necessary to render this paper timely. The Commissioner is provided authority charge any fees due or credit any overpayment to Deposit Account No. 50-0694.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on 10 February 2005.

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